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□□□□□Ⅰ□□□□13□□□□□□3□□□39□□

1.□□□□□□□□□□□□□□□C□□□□□□□□□□□□□□□□□□□□□□□□□□□（　　）

A. $F\cdot V$　　B. $A\cdot s$　　C. J/V　　D. $N\cdot m/V$

□□□□B

□□□□

□□□□□□□□□□□$q=It$□□□□□I□□□□A□□□t□□□□s□□□□□□□□□□□□□□□□□□□□□A•s□□B□□□ACD□□□

□□B□

2.□□□□□□□□□4□□□□□□□a□□□b□□□□□□□□□□□□□□□□□□□□□□□□□□（　　）

A. □□□□□□□□□□□□□□□□□□□□□□

B. □□□□□□□□a□□□□□□□□□□□

C. □□□□□□□□□□□□□□□□□□□□□□□□

D. □□□□□□□□b□□□□□□□□□□□□

□□□□B

□□□□

□□□□A□□□A□□□

B□□□□□□□□□□□□□□a□□□□□□□□□□□□B□□□

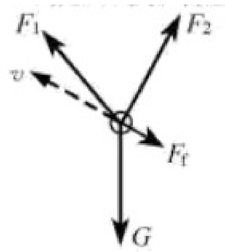
C□□C□□□

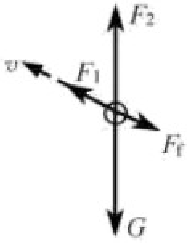
D□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□D□□□

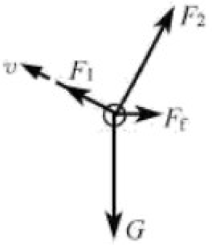
□□B□

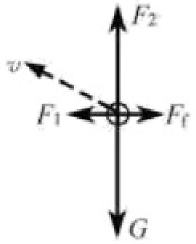
3.□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□v□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□G□□□□□F_1□□□□□□□□□□F_2□□□□□□□□□□□□F_f□□□□□□□□□□□□□□□□□□□

□

A. 

B. 

C. 

D. 

□□□□A

□□□□

□□□□□□□□□□□□□□□□G□□□□□□□□□□□F_f□□□□□□□□□□□□F_2□□□□□□□□□□□□□□□□□□□□□□A□□□□□□□□

□□A□

4.□□□（　　）

A. □□□□□37.3℃□□□□□□□□□

B. □□□□□□□□□□□□□□□□□□□□

C. □□□□□□□□□□□□□□□□□□□□□

D. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□D

□□□□

□□□□AB□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□A□□□B□□□

CD□□

[illegible]C [illegible]D [illegible]

[illegible] D[illegible]

5.[illegible]　　[illegible]

A. [illegible]

B. [illegible]α [illegible]

C. [illegible]

D. [illegible]

[illegible]D

[illegible]

[illegible]A[illegible]

$$\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mE_k}}$$

[illegible]$\lambda \propto \frac{1}{p}$[illegible]$\lambda \propto \frac{1}{\sqrt{E_k}}$[illegible] A [illegible]

B[illegible]γ [illegible] B [illegible]

C[illegible]

$$E_k = h\nu - W$$

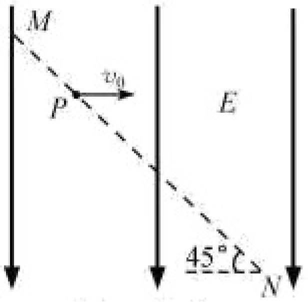
[illegible]$h\nu_0 = W$[illegible] C [illegible]

D[illegible] D [illegible]

[illegible] D[illegible]

6.[illegible] m[illegible]q[illegible]$q > 0$[illegible]v_0[illegible]MN[illegible] P [illegible] E[illegible]

[illegible]MN[illegible]45°[illegible]MN[illegible]　　[illegible]



A. □□□□□ $\frac{mv_0}{qE}$

B. □□□□□ $3v_0$

C. □ P □□□□□ $\frac{2\sqrt{2}mv_0^2}{qE}$

D. □□□□□□□□□□□□□ 30°

□□□□C

□□□□

□□□□A□□□□□□□□□□□□□□□□□□□

$$x=v_0t$$

□□□□

$$y=\frac{1}{2}\frac{Eq}{m}t^2$$

□

$$\tan 45^\circ=\frac{y}{x}$$

□□

$$t=\frac{2mv_0}{Eq}$$

□A□□□

B□□□

$$v_y=\frac{Eq}{m}t=2v_0$$

□□□□□□□□

$$v=\sqrt{v_0^2+v_y^2}=\sqrt{5}v_0$$

□B□□□

C□□□□□□□□□□p□□□□□

$$L=\sqrt{2}v_0t=\frac{2\sqrt{2}mv_0^2}{Eq}$$

□C□□□

D□□□□□□□□$\tan\alpha=2\tan\beta$□□□□□□

$$\tan\alpha=2\tan45^{\circ}=2$$

□D□□□

□□C□

7.□□□□□□“□□□□”□□

3:2□□□□□□□□□□□（　　）

A. □□□□□□2:3

B. □□□□□□□$\sqrt{3}:\sqrt{2}$

C. □□□□□□□$2\sqrt{2}:3\sqrt{3}$

D. □□□□□□□□□9:4

□□□C

□□□

□□□A□□□□□□□

$$C_{□}=2\pi r_{□}$$

$$C_{\square}=2\pi r_{\square}$$

□□□□□□□□□□□□□□□□□□□□□

$$\frac{C_{\square}}{C_{\square}}=\frac{2\pi r_{\square}}{2\pi r_{\square}}=\frac{3}{2}$$

A □□□

BCD□□□□□□□□□□□□□□□

$$G\frac{Mm}{r^2}=ma=m\frac{v^2}{r}=m\omega^2 r$$

□□

$$a=\frac{GM}{r^2}$$

$$v=\sqrt{\frac{GM}{r}}$$

$$\omega=\sqrt{\frac{GM}{r^3}}$$

□

$$\frac{a_{\square}}{a_{\square}}=\frac{r_{\square}^2}{r_{\square}^2}=\frac{4}{9}$$

$$\frac{v_{\square}}{v_{\square}}=\frac{\sqrt{r_{\square}}}{\sqrt{r_{\square}}}=\frac{\sqrt{2}}{\sqrt{3}}$$

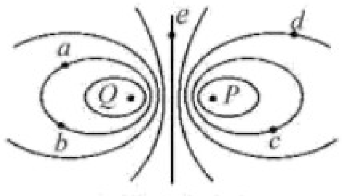
$$\frac{\omega_{\square}}{\omega_{\square}}=\frac{\sqrt{r_{\square}^3}}{\sqrt{r_{\square}^3}}=\frac{2\sqrt{2}}{3\sqrt{3}}$$

BD □□□C □□□

□□C□

8.□□ P□Q □□□□□□□□□□□□□□□□□□□□□□ Q □□□□□□□P□Q □□□□□□□□□□□□□□□□□□□a□b□c□d□e

□□□□□5 □□□□□□□□□□□□0□□□　　□



A. e□□□□□0

B. a□□b□□□□□□

C. b□□□□□d□□□

D. □□□a□□□c□□□□□

□□□D

□□□

□□□A□□□□□□□□□□□□□□P□□□□□□□□□□□0□e□□PQ□□□□□□□□$\varphi_e=0$□A□□□

B□a□b□□□□□□□□□□□□□a□b□□□□□□□B□□□

C□□Q□P□□□□□□$\varphi_b>\varphi_d$□C□□□

D□□$\varphi_a>\varphi_c$□□□□a□c□□□□□□□□□□□D□□□

□□D□

9.□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□I_1□I_2□$I_1>I_2$□

a□b□c□□□□□□□□□□□b□□□□□□□□□a□c□□b□□□□□d□□b□□□□□□□□□□

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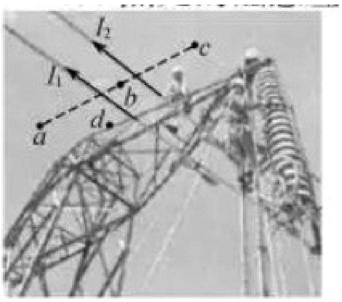


A. b□□□□□□□□□0

B. d□□□□□□□□□0

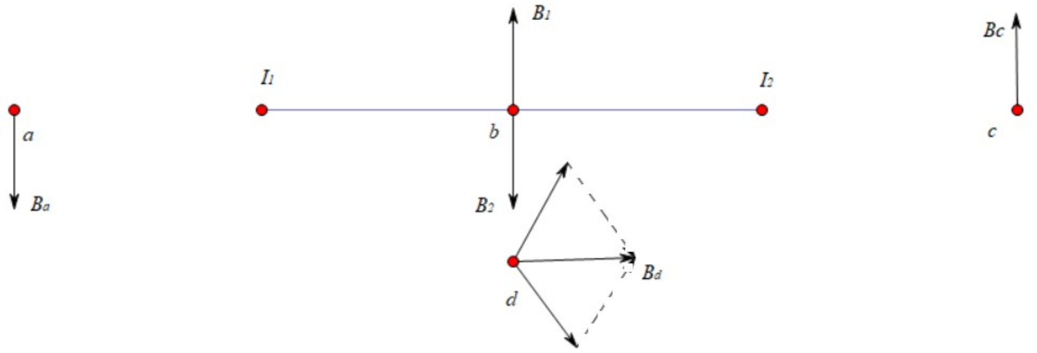
C. a□□□□□□□□□□□

D. c□□ □□□□□□□□□

□□□□C

□□□□

□□□□A□□□□□□□□□□□□□□□□□□□□□□□□□



I_1□b□□□□□□□□□□□I_2□b□□□□□□□□□□□□□

$I_1 > I_2$

□

$B_1 > B_2$

□□b□□□□□□□□□□□A□□□

BCD□□□□□□d□□□□□□□□□□□□a□□□□□□□□□□□□□c□□□□□□□□□□□□□BD□□□C□□□

□□C□

10.□□□“□□□□”500m□□□□□□□□□□□□□□□□□□□□□□□□□□□□□m□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□$\frac{5}{6}mg$□□□□□□□□□□□□□□□□“□□□□□□□□”□□□□□□

□□□□□□□□□□□□□　　　□

A. [illegible]$\frac{1}{6}mg$

B. [illegible]$\frac{1}{6}mg$

C. [illegible]$\frac{1}{6}mg$

D. [illegible]$\frac{1}{6}mg$

[illegible]D

[illegible]

[illegible]A[illegible]m[illegible]

$$G = mg$$

A [illegible]

B[illegible] 0[illegible]B [illegible]

C[illegible]$\frac{1}{6}mg$[illegible]C [illegible]

D[illegible]F[illegible]

$$F = mg - \frac{5}{6}mg = \frac{1}{6}mg$$

[illegible]

$$F' = \frac{1}{6}mg$$

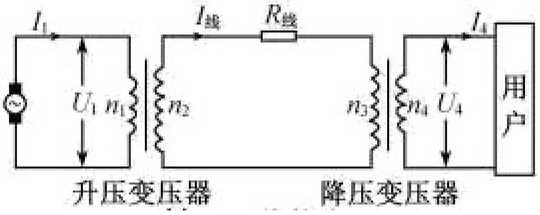
D [illegible]

[illegible] D[illegible]

11.[illegible]$P = 100\text{kW}$[illegible]$U_1 = 250\text{V}$[illegible]

$R_{[illegible]} = 8\Omega$[illegible]$U_4 = 220\text{V}$[illegible]$P_{[illegible]} = 5\text{kW}$[illegible]

[illegible]　　[illegible]



A. □□□□□□□□ $I_1=40\text{A}$

B. □□□□□□□ $I_{□}=625\text{A}$

C. □□□□□□□□□ $n_3:n_4=190:11$

D. □□□□□□□ $I_4=455\text{A}$

□□□□C

□□□□

□□□□A□□□□□□□□

$$P=UI$$

□□□□□□□

$$I_1=\frac{P}{U_1}=400\text{A}$$

A□□□

B□□□□□□□□□ 5kW □□

$$P_{□}=I_{□}^2R_{□}$$

□□

$$I_{□}=\sqrt{\frac{P_{□}}{R_{□}}}=25\text{A}$$

□B□□□

C□□□□□□□□□□□□□□□□□□□□□□□

$$\frac{I_{\square}}{I_4}=\frac{n_4}{n_3}=\frac{\sqrt{\frac{5000\text{W}}{8\Omega}}}{\frac{95000\text{W}}{220\text{V}}}=\frac{11}{190}$$

C □□□

D□□□□□□□□□ 95kW □□□□□□□□

$$I_4=\frac{95000\text{W}}{220\text{V}}\approx 432\text{A}$$

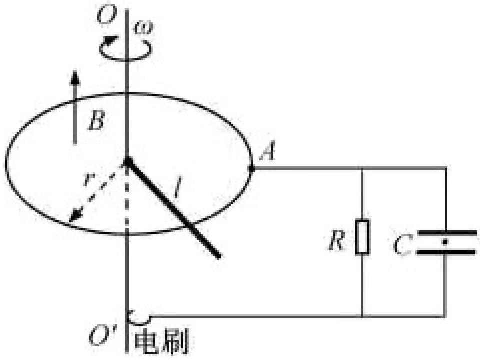
D □□□

□□C□

12.□□□□□□□□□□□□□□□□ r □□□□□□□□□□□□□□□□□□□□□□□ B □□□□□□□□ l □□□□□□□□□□□□□

□□□□□□□□□□□□□□ OO' □□□□□□□□ ω □□□□□□□□□ A □□□□□□□□□□ R □□□□□□□ C □□□□□ d □

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ g □□□□□□□□□□□□□□□□□□□□   □



A. □□□□□□□□ $\frac{1}{2}Bl^2\omega$

B. □□□□□□□□□□□□ $\frac{2gd}{Br^2\omega}$

C. □□□□□□□□□ $\frac{\pi B^2 r^4\omega}{2R}$

D. □□□□□□□□□□ $CBr^2\omega$

□□□□B

□□□□

□□□□A□□□□□□□□□□ OO' □□□□□□□□□□□□□□□□

$$E=Br\cdot\frac{\omega r}{2}=\frac{1}{2}Br^2\omega$$

A □□□

B□□□□□□□□□□□□□□□□□ E □□□□□□□□□□□□□□□□□□

$$q\frac{E}{d}=mg$$

□

$$\frac{q}{m}=\frac{dg}{E}=\frac{dg}{\frac{1}{2}Br^2\omega}=\frac{2dg}{Br^2\omega}$$

B □□□

C□□□□□□□□

$$P=\frac{E^2}{R}=\frac{B^2r^4\omega^2}{4R}$$

C □□□

D□□□□□□□□□□

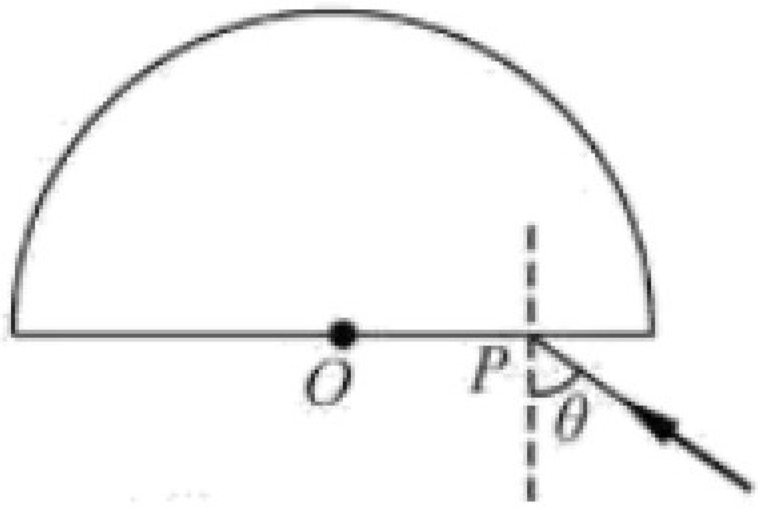
$$Q=CE=\frac{CBr^2\omega}{2}$$

D □□□

□□ B□

13.□□□□□□□□ O□□□□ R □□□□□□□□□□□□□□□□□□ P □□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$\theta=60^\circ$ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ c□□□　　□



A. □□□ □□□□1.5

B. OP□□□□□□$\frac{\sqrt{2}}{2}R$

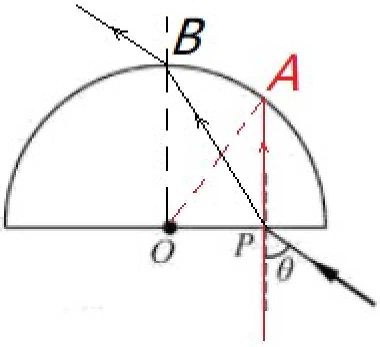
C. □□□□□□□□□□□□$\frac{\sqrt{3}}{3}c$

D. □□□□□□□□□□□□$30°$

□□□□C

□□□□

□□□□AB□□□□□□□□□□□□□□□□□



□$OP=x$□□A□□□□□□□□

$$\sin C=\frac{1}{n}=\frac{x}{R}$$

□□□□□□□□□ B □□□□

$$n=\frac{\sin 60^{\circ}}{\sin\angle OBP}$$

□□

$$\sin\angle OBP=\frac{x}{\sqrt{x^2+R^2}}$$

□□□□ $n=\sqrt{3}$ □ $x=\frac{\sqrt{3}}{3}R$ □□ AB □□□

C□□

$$v=\frac{c}{n}$$

□□ $v=\frac{\sqrt{3}}{3}c$ □□ C □□□

D□□□

$$\sin C=\frac{1}{n}=\frac{\sqrt{3}}{3}$$

□□□□□□□ 30°□□ D □□□

□□ C□

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14.□□□□□□□□□□□ $4\times10^{26}\,\mathrm{W}$ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ $1876.1\,\mathrm{MeV}/c^2$ □ c □□□□□□□□□□□□ ${}_{1}^{2}\mathrm{H}$ □□□□□□□□ $2809.5\,\mathrm{MeV}/c^2$ □□□□ ${}_{1}^{3}\mathrm{H}$ □□□□□□□□□□ $3728.4\,\mathrm{MeV}/c^2$ □□□□ ${}_{2}^{4}\mathrm{He}$ □□□□□□ X □□□□□□□□□□ $17.6\,\mathrm{MeV}$ □□□□□□□□□□□□□□□（　　）

A. X □□□□□

B. X 的质量约为 $939.6\text{MeV}/c^2$

C. 太阳每秒因为辐射损失的质量约为 $4.4\times10^9\text{kg}$

D. 太阳每秒因为辐射损失的质量约为 $17.6\text{MeV}/c^2$

【答案】BC

【解析】

【详解】A．由质量数和电荷数守恒可知，X 的质量数为 1，电荷数为 0，则 X 为中子，选项 A 错误；

B．根据能量关系可知

$$m_n c^2 = 1876.1 + 2809.5 - 3728.4 - 17.6$$

解得 $m_n = 939.6\text{MeV}/c^2$，选项 B 正确；

C．太阳每秒放出的能量

$$E = Pt = 4\times10^{26}\text{J}$$

损失的质量

$$\Delta m = \frac{E}{c^2} = \frac{4\times10^{26}}{(3\times10^8)}\text{kg} \approx 4.4\times10^9\text{kg}$$

选项 C 正确；

D．因为

$$E = 4\times10^{26}\text{J} = \frac{4\times10^{26}}{1.6\times10^{-19}}\text{eV} = 2.5\times10^{45}\text{eV} = 2.5\times10^{39}\text{MeV}$$

则太阳每秒因为辐射损失的质量为

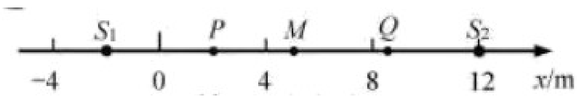
$$\Delta m = \frac{E}{c^2} = 2.5\times10^{39}\text{MeV/c}^2$$

选项 D 错误。

故选 BC。

15. 在均匀介质中x轴上 -2m 和 12m 处分别有两个周期都为 4s、振幅都为 1cm 的相干波源 S_1、S_2，$t=0$ 时刻两波源同时开始振动，

□□□□□□□□$4m$□x□□□□□□□□□P□M□Q□□□x□□$2m$□$5m$□$8.5m$□□□□□□□□□□□□□□（　　）



A. $6.0s$□P□M□Q□□□□□

B. $8.0s$□M□□□□□□$2cm$

C. $10.0s$□P□□□□□□0

D. $10.5s$□Q□□□□□□□□□

【□□】CD

【□□】

【□□】A□□□□

$$v=\frac{\lambda}{T}=\frac{4}{4}m/s=1m/s$$

□6s□□□□□□6m□□□□PQ□□□□□□□□M□□□□□A□□□

B□□M□□□□□□□□□□□□M□□□□□□□□□2cm□□□□□□□□2cm□B□□□

C□P□□□□□□□□□□□6cm□□□□□3□□□□□□□□□□□□□□□□□□10.0s□P□□□□□□□□□C□□□

D□S_1□□□□□□□Q□□□□□$\frac{10.5}{1}s=10.5s$□□10.5s□Q□□S_1□□□□□□□□□□□S_2□□□□□□□Q□□

□□□$\frac{3.5}{1}s=3.5s$□□10.5s□Q□□S_2□□□□□□□□□□7s□□□□□□□□□□□□□□□10.5s□□Q□□□□□□

□□□□□□D□□□

□□CD□

16.□□$20kg$□□□□□$5kW$□□□□□

□□□□□□□□□□□□□□□□$200s$□□$100m$□□□□□□□□□□□□□□□□□□□□□□□□□$400V$□□□□□□□□□□□□□□□□

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A. □□□□□□□□□□□□□□□□ 200N

B. □□□□□□□□□□□□□□□ 12.5A

C. □□□□□□□□□ □□□□□ 100W

D. □□□□□□□□□□□□□□□□□□□□□

□□□□BD

□□□□

□□□□A□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□200N □□□200N□□□□□200N□□□A □□□

B□□□□□□□□□□□□□□□□

$$I=\frac{P}{U}=\frac{5000}{400}\text{A}=12.5\text{A}$$

□□ B □□□

C□□□□□□□□□□□□□

$$F=mg=200\text{N}$$

□□□□□□□□□□□□□□□□

$$\overline{P}=\frac{Fh}{t}=\frac{200\times100}{200}=100\text{W}$$

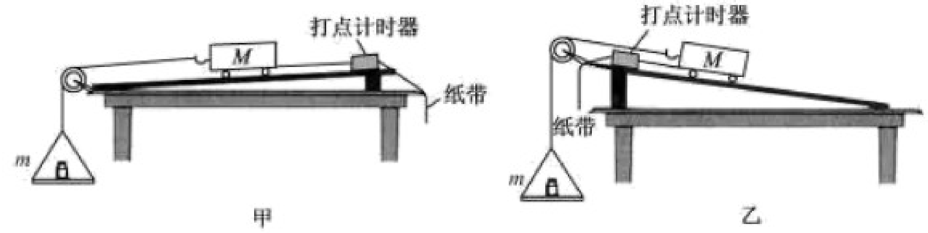
□□□□□□□□□□□□□□□□□□□□□200N□□□□C □□□

D□□D □□□

□□ BD□

□□□□□□□□□□6 □□□□55 □□

17.□“□□□□□□□□□□□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

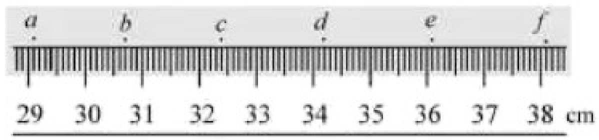


[illegible]i[illegible] M [illegible]

[illegible]ii[illegible] m [illegible] a [illegible]

[illegible]iii[illegible] $a-F$ [illegible]

① [illegible] a、b、c、d、e、f [illegible] d [illegible] $v_d=$_____ m/s [illegible]



② [illegible] $M \gg m$ [illegible]_____[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible] $a-F$ [illegible] mg [illegible] F [illegible]_____[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible] (1). 0.18[illegible]0.19 (2). [illegible] (3). [illegible]

[illegible]

[illegible]①[1][illegible]

$$T=0.1\text{s}$$

[illegible] d [illegible]

$$v_d=\frac{bf}{4T}=\frac{(38.10-30.70)\times 10^{-2}}{4\times 0.1}\text{m/s}\approx 0.19\text{m/s}$$

②[2][3][illegible]

$$mg=(M+m)a$$

[illegible]

$$a=\frac{m}{m+M}\cdot g$$

[illegible]

$$F = Ma = \frac{M}{m + M} \cdot mg$$

□ $M \gg m$ □□□□□□□□□□□□□□□□□□□□

□□□□□□ $M \gg m$ □

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ θ □□□□□□□□□□□□□□□□□□□□ f□□□

$$Mg\sin\theta = f + mg$$

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$$Mg\sin\theta - f = Ma$$

□

$$mg = Ma$$

□□□□□□□□□□□□ $M \gg m$

□□□□□□□□□□□□□□□□□□ mg □□□□□□□□□□□□□□□□□ F□

18.□□□□□□□□□□□□□□□

① □□□□□□□□□□□□□□□□□□_____□□□□□

A□□□□□□□□□

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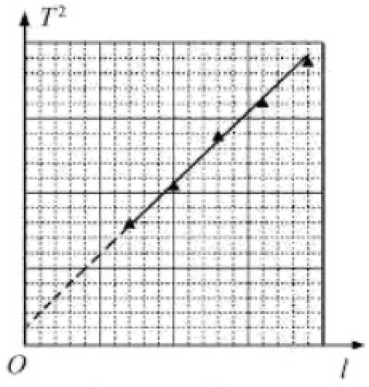
② □□□__

___□



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B□□□□□□□□□

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D□□□□□□□□□□□□□□□□□

□□□□ (1). BC (2). C

□□□□

□□□□①[1]□A□□□□□□□□□□□□□□□□□□□□□□□□□□□5°□□□□□□□□□□□A □□□□

B□□□□□□□□□□□□□□□□□□□□□□□□□□B □□□□

C□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□C □□□□

D□□□□□□□□□□□□□□□□□□□D □□□□

②[2]□□□□□

$$T=2\pi\sqrt{\frac{l}{g}}$$

□

$$T^2=\frac{4\pi^2}{g}\cdot l$$

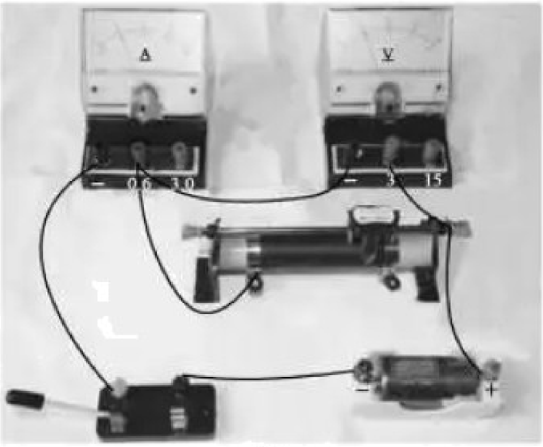
□□□□□ T^2-l □□□□□□□□□□□□□□□□□□□ $\frac{4\pi^2}{g}$ □□

$$T^2=\frac{4\pi^2}{g}\cdot(l+l_0)$$

□□□□□□□□□□□□□□□□□□

19.□□□□□□□□□□□□□□□□□□□□□□□

(1)[illegible]____________[illegible]



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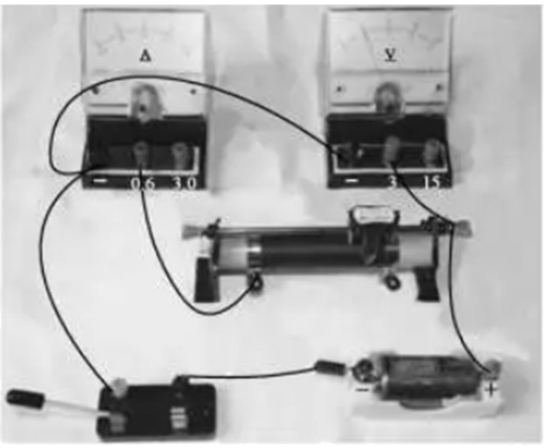
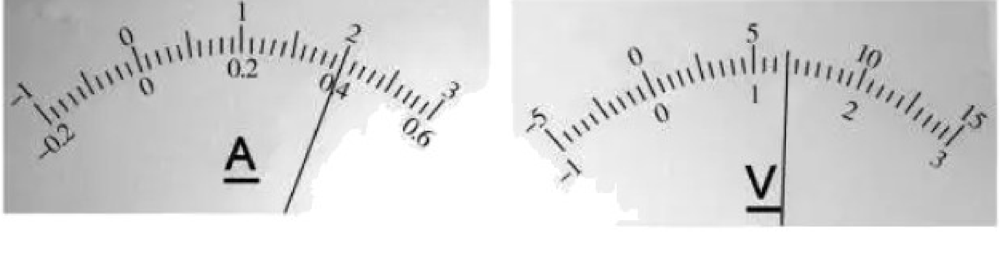
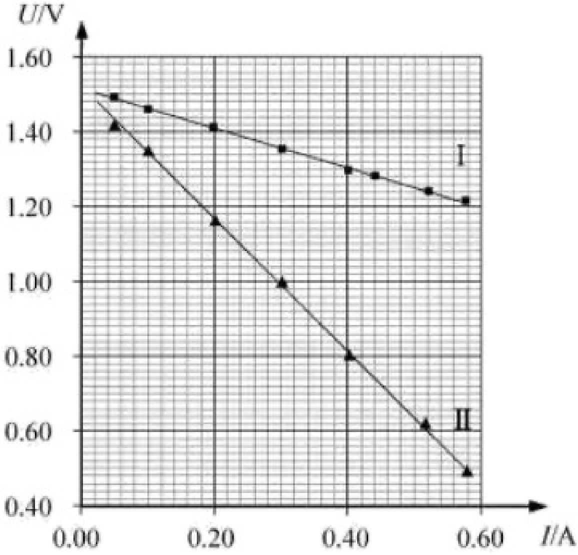


乙

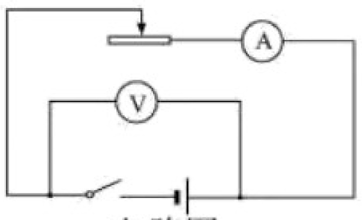
(2)[illegible] $I=$ _____ A [illegible] $U=$ _____ V [illegible]



(3)[illegible]I[illegible]1_____[illegible]“[illegible]”[illegible]“[illegible]”[illegible]



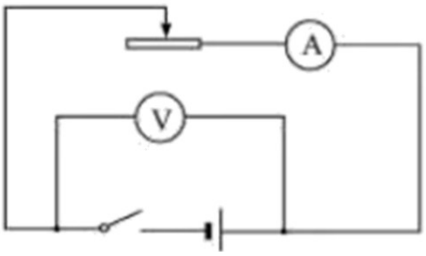
(4)□□□□□□□E=_____V□□□□□□□□□□□□□r=_____Ω□□□□□□□□□□□

□□□□ (1). 
电路图
(2). 0.39□0.41 (3). 1.29□1.31 (4). □

(5). 1.51□1.54 (6). 0.52□0.54

□□□□

□□□□(1)[1]□□



(2)[2][3]□□□□□□□□□□1.5V□□□□□□□0~3V□□□□□□0~0.6A□□□□□□□□

1.30V□1.29□1.31V□□□0.40A□0.39□0.41A□□□

(3)[4]□□□□□□□□

$$U=E-Ir$$

□□U-I□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$$r_{□}=r_{□}+r_{A}$$

□□□□□□□□□□□

$$r_{□}=\frac{r_V}{r_{□}+r_V}r_{□}$$

□□□□□□□□□□ $R_V \gg r_{□}$ □□□□□□□□□□□□□□□□□□□I□□□□□□□II□□□□□□

(4)[5]□□II□□□□□□□□□□□□□□□□□E=1.52V□

[6]□□□I□□□□□□□□□□□□I=2.86A

□

$$r=\frac{E}{I}=\frac{1.52\text{V}}{2.86\text{A}}=0.53\Omega$$

□□□□□□□□□□

20.□□1□□□□□□□$m=200\text{kg}$□□□$\frac{1}{4}$

□□□□□□□□□□□□□□□□□□□□$F-t$□□□□2□□□$t=34\text{s}$□□□□□0□□□□□□□□□□□□□□□□□□□□□

□□□□□□

(1)□□□□□□□□□□□□□□□□

(2)□□□□□□□□□□

(3)□□□□□□□

图 1

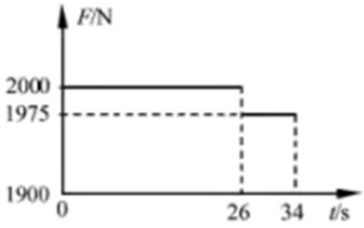


图 2

□□□□(1) 0.125m/s^2□□□□□□(2)1m/s□(3)40m

□□□□

□□□□(1)□□2□□0~26s□□□□□□□26s~34s□□□□□□□□□□□□□□□□□□□□□□□

$$mg-F_T=ma$$

□□□2□□□F_T=1975N□□□

$$a=g-\frac{F_{\mathrm{T}}}{m}=0.125\mathrm{m/s^2}$$

□□□□□□□

(2)□□□2□□□□□□□□

$$v=at_2=0.125\times(34-26)\ \mathrm{m/s}=1\mathrm{m/s}$$

(3)□□□□□□□□□□□□□

$$h_1=vt_1=1\times26\mathrm{m}=26\mathrm{m}$$

□□□□□□□□

$$h_2=\frac{v}{2}t_2=\frac{1}{2}\times8\mathrm{m}=4\mathrm{m}$$

□□□□□□□□□□□□□$\frac{1}{4}$□□□□□□□□□□□□□□□□□□$\frac{3}{4}$□□□

$$h_1+h_2=\frac{3}{4}h$$

□□□□□□

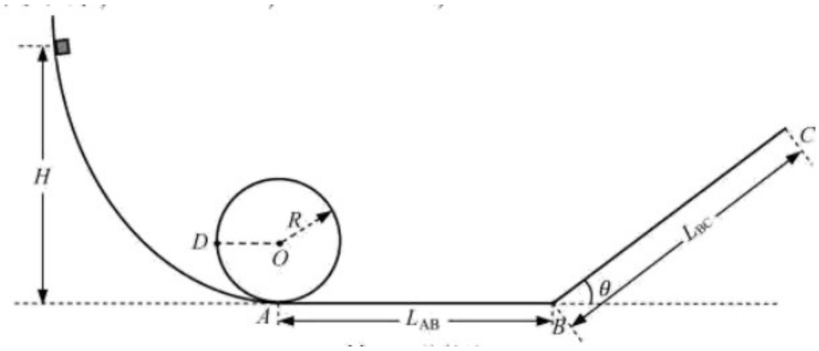
$$h=40\mathrm{m}$$

21.□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□AB□□□$\theta=37^\circ$□□□□BC□□□□□□□□□$m=0.1\mathrm{kg}$□□□□□□□□□□□□$H=1.0\mathrm{m}$□□□□□□□□$R=0.2\mathrm{m}$□$L_{\mathrm{AB}}=L_{\mathrm{BC}}=1.0\mathrm{m}$□□□□□□$AB$□$BC$□□□□□□□□□$\mu=0.25$□□□□□□□□□□□□□□□□□□□□□□

(1)□□□□□□□□□O□□□D□□□□□□□□□

(2)□□□□□□□□□□□□□□□□□□C□□

(3)□□□□□□□□□□□□□□□□□A□x□□□□□$2m$□□□□□□□□□□□□□□□□□□□□0.25□□□□□□□BC□□□□□□h□x□□□□□□□□□□□□□□$\sin37^\circ=0.6$□$\cos37^\circ=0.8$□



□□□□(1)8N□□□□□□□□(2)□□□□□(3) $h=\frac{1}{6}x-\frac{5}{48}$□$\frac{5}{8}\text{m}<x\le 1\text{m}$□□$h=0$□$0\le x\le\frac{5}{8}\text{m}$□

□□□□

□□□□(1)□□□□□□□

$$mgH=mgR+\frac{1}{2}mv_D^2$$

□□□□□□

$$F_N=\frac{mv_D^2}{R}=8\text{N}$$

□□□□□□

$$F_N'=F_N=8\text{N}$$

□□□□□□

(2)□□□□□□□□□□□□□C□□□□□□

$$mgH=\mu mgL_{AB}+\mu mgL_{BC'}\cos\theta+mgL_{BC'}\sin\theta$$

□

$$L_{BC'}=\frac{15}{16}\text{m}<1.0\text{m}$$

□□□□□

(3)□□□□□□A□x□□□□□v□□□□□

$$mgH-\mu mgx=\frac{1}{2}mv^2$$

□□□□□□□ v' □□□□□□□

$$mv=3mv'$$

□□□□□□□□□□□□□□□□ h □□□□□

$$-3\mu mg(L_{AB}-x)-3\mu mg\frac{h}{\tan\theta}-3mgh=0-\frac{1}{2}(3m)v'^2$$

□

$$h=\frac{1}{6}x-\frac{5}{48}\left(\frac{5}{8}\text{m}<x\le 1\text{m}\right)$$

$$h=0\left(0\le x\le\frac{5}{8}\text{m}\right)$$

22.□□1□□□□□□□□□□□□□□□□ O □□□□□□□□□□□□□□□ x □□□ $0\le x\le 1.0\text{m}$ □□□□□□□□□□□□□□□□

□□□□□□□□□ $L=0.5\text{m}$ □□□ $R=0.25\Omega$ □□□□□□ $abcd$ □□□□□□□□□□ cd □□□□□□□□□□ x □□□□□

F □□□□ $v=1.0\text{m/s}$ □□□□□□□□□□□□□ ab □□□□□□□□□□□□□□□ cd □□□□□□□□□□□□□□□ $0\le t\le 1.0\text{s}$ □□

□□□□ B □□□□□□ t □□□□□2□□□□ $0\le t\le 1.3\text{s}$ □□□□□□□□□□□□

(1)□□□ F □□□□

(2)□ $1.0\text{s}\le t\le 1.3\text{s}$ □□□□□□□□□□□□□□□□□□ B □□□□□□ t □□□□

(3)□□ $0\le t\le 1.3\text{s}$ □□□□□□□□□□□□□ q □

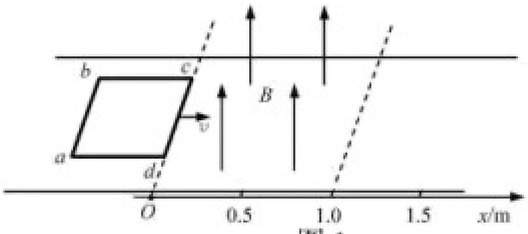


图 1

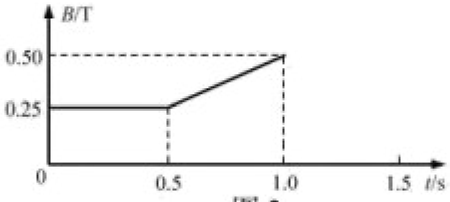


图 2

□□□□(1) $0.0625\mathrm{N}$□(2) $B=\frac{1}{6-4t}$□(3) $0.5\mathrm{C}$

□□□□

□□□□(1)□□2□□ $t_0=0, B_0=0.25\mathrm{T}$ □□□□□□

$$I=\frac{B_0 L v}{R}$$

□□□

$$F_{\mathrm{A}}=\frac{B_0^2 L^2}{R}v$$

□□□□

$$F=F_A=0.0625\mathrm{N}$$

(2)□□□□□□□□□□0□□□□□□ $\Phi_1=\Phi$ □ $t_1=1.0\mathrm{s}$ □□ $B_1=0.5\mathrm{T}$ □□□□ $\Phi_1=B_1L^2$ □□ t □□□□□□

$$\Phi=BL\left[L-v\left(t-t_1\right)\right]$$

□□

$$B=\frac{1}{6-4t}$$

(3) $0\le t\le 0.5\mathrm{s}$ □□□

$$q_1=\frac{B_0L^2}{R}=0.25\mathrm{C}$$

$0.5\mathrm{s}\le t\le 1.0\mathrm{s}$ □□□

$$q_2 = \frac{B_1L^2 - B_0L^2}{R} = 0.25\text{C}$$

[illegible]

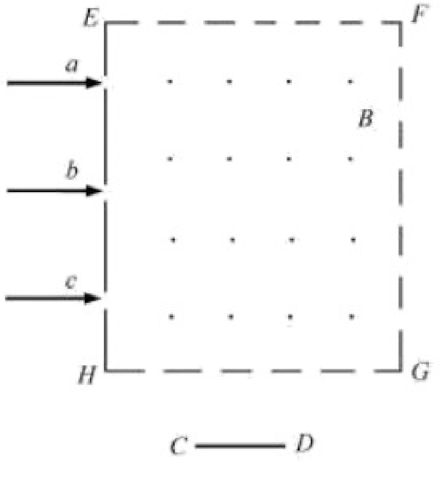
$$q = q_1 + q_2 = 0.5\text{C}$$

23.[illegible] $EFGH$ [illegible] B [illegible] CD [illegible] HG [illegible] a、b、c [illegible] EH [illegible] b [illegible] R [illegible] HG [illegible] D [illegible] N [illegible] $0.6R$ [illegible] CD [illegible] $0.5R$ [illegible] m [illegible] q [illegible]

(1)[illegible] v [illegible] c [illegible] HG [illegible] H [illegible] s [illegible]

(2)[illegible] HG [illegible] L_{max} [illegible]

(3)[illegible] F [illegible] HG [illegible] L [illegible]



[illegible] (1) $v = \frac{qBR}{m}$，$0.8R$；(2) $L_{max} = \frac{4}{15}R$；(3) [illegible] $0 < L \leq \frac{4}{15}R$ [illegible] $F_1 = 2.6NqBR$ [illegible]

$\frac{4}{15}R < L \leqslant 0.4R$□□ $F_2 = 1.8NqBR$□□ $L > 0.4R$□□ $F_3 = NqBR$

□□□□

□□□□(1)□□□□□□□□□□□□

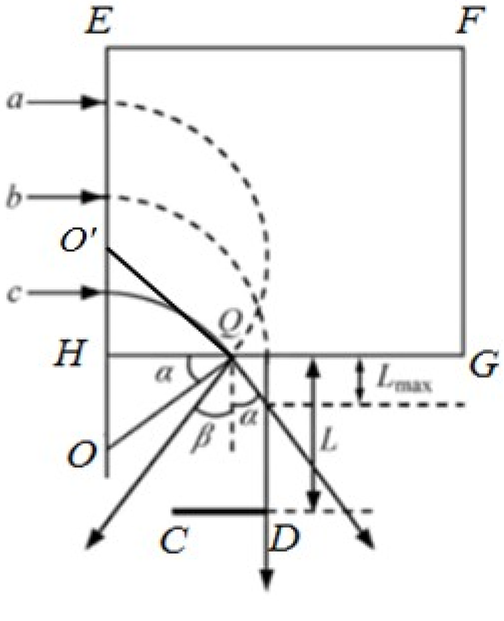
$$qvB = \frac{mv^2}{R}$$

□□□□□□□□

$$v = \frac{qBR}{m}$$

□c□□□□□□□□□□□□□□□O□□□□□□HG□□Q□□□□□□□□□□□□

$$OH = 0.6R□\ s = HQ = \sqrt{R^2 - (0.6R)^2} = 0.8R$$



(2)a□□□□□□□□□□□□□□□O'□□□□□□HG□□□□□□H□□□□□x□□□□□□□□

$$HO' = aH - R = 0.6R$$

$$x = \sqrt{R^2 - HO'^2} = 0.8R$$

□ a□c □□□□□□□□□ Q □□□□□□□□□□□□□□□□□□□□□□□□□ β □ α □□□□□□□□□

$$\alpha = \beta$$

□□□□□□□□□□ c □□ □□□□□□□□□□□ D □□□□□□□□□□ HG □□□□□□□

$$\tan\alpha = \frac{R - s}{L_{max}} = \frac{OH}{s}$$

□

$$L_{max} = \frac{4}{15}R$$

(3) a □ c □□□□□□□□□□□□□□

$$p_z = p\cos\alpha = 0.8qBR$$

□ $0 < L \leq \frac{4}{15}R$ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$$F_1 = Np + 2Np_z = 2.6NqBR$$

□ $\frac{4}{15}R < L \leq 0.4R$ □□ □□ b □ c □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$$F_2 = Np + Np_z = 1.8NqBR$$

□ $L > 0.4R$ □□ □□ b □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

$$F_3 = Np = NqBR$$